17. (Amended)A timer for controlling the activation time delay or deactivation time delay of a load, the timer including:

a control unit having an internal timer;

a relay unit connected between the control unit and the load, wherein the control unit activates the relay unit to supply power to the load; and

a time base dial coupled to the control unit, the time base dial movable between a plurality of discrete time base settings to set the duration of the time delay in the control unit, wherein the time base settings increase non-linearly from a minimum setting to a maximum setting,

wherein the time base settings increase exponentially from the minimum setting to the maximum setting.

18. (Amended)The timer of claim 17 wherein the time base dial generates a digital signal defining thirty-two discrete time base settings.

REMARKS

In the Office Action of October 7, 2002, the Examiner rejected claims 7, 15 and 18 under 35 USC §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Specifically, the Examiner indicated that it was not understood how the time base dial was a digital switch.

By the present amendment, claims 7, 15 and 18 have been amended to specifically indicate that the time base dial generates a digital signal that defines 32 discrete time base settings. Based on the amendment, the applicant is believed to have addressed the §112 problem identified by the Examiner.

In the Office Action, claims 1-6, 8-14, 16 and 17 were rejected under 35 USC §103(a) as being unpatentable over the Payne et al. U.S. Patent No. 4,227,062 in view of the Rulseh U.S. Patent No. 3,992,960. Claims 7, 15, 18 and 19 were rejected under 35 USC §103(a) as being unpatentable over the Payne '062 patent in view of the Rulseh '960 patent in further view of the Scalf U.S. Patent No. 4,430,540.

Reconsideration of the substantive rejection of the claims in view of the foregoing claim amendments and the following arguments for allowance is respectfully requested.

Claims 1-8

In the Office Action, the Examiner rejected independent claim 1 based primarily upon the Payne '062 patent. Specifically, the Examiner stated that the Payne '062 patent taught the entire claimed invention except for the time based settings increasing non-linearly from a minimum setting to a maximum setting. Upon reviewing the Payne '062 patent in detail, the applicant disagrees with such findings by the Examiner.

The Payne '062 patent is directed to a system and method for controlling the activation of a browning system and a microwave system contained within a single microwave oven. Specifically, the Payne '062 patent is directed to a control system that controls the amount of time the browning system is activated relative to the amount of time the microwave system is activated in order to provide for the desired heating and cooking of a food product.

In the Payne '062 patent, the microwave oven 10 includes an upper control knob 34 that allows a user to select the total duration of a cooking operation. The upper control knob 34 is a conventional control knob that allows the operator to select a cooking duration from as little as a minute up to an hour or more.

In addition to the control knob 34, the microwave oven includes a second apportionment control knob 36 that allows the user to control the time ratio between the energization of the microwave energy source and the energization of the browning unit. As best seen in Fig. 2, the control knob 36 includes an outer series of numbers between 0 and 9 that relate to the microwave energy source and an inner series of aligned numbers ranging from 0 to 10 correlating to the browning system. A single inner knob 44 can be rotated such that the user can select between the apportionment of the microwave energy and the browning energy. As can be seen by a comparison of the inner and outer rings, the sum of the microwave power and the browning power is always 10. Thus, the control knob 36 allows the user to control the

percentage of microwave energy relative to the browning energy used in cooking a food product.

As illustrated in Figs. 4a-4e of the Payne '062 patent, the control unit defines a time share cycle 52 during which the energy to the microwave system and the browning system is shared. As illustrated in the graphs of Fig. 4, the length of the time share cycle 52 changes depending upon the percentage setting for the microwave energy versus the browning energy. The duration of the time share cycle 52 is completely independent of the overall cooking time set by the upper control knob 34.

During the time share cycle 52, the browning system is turned on for an initial time interval 54 before the beginning of an alternating interval 56. Once again, the length of the initial interval 54 and the length of the alternating interval 56 are not related to the overall cooking time selected by the position of the dial 34.

During the alternating interval 56, the control unit defines a series of one second intervals during which the browning system and the microwave system are turned on and off based on the position of the rotatable knob 44. For example, in Fig. 4b, the microwave source is turned on for a subinterval 58 and the browning system is turned on for a subinterval of 60 when the knob 44 is at the 75% browning position. Once again, the one second interval, which generally corresponds to the duration of the repeating cycle, is set without any regard to the position of either of the dials contained on the microwave oven. Instead, the duration of the repeating cycle is set at one second and the activation times of the browning system and the microwave system relative to each other within the one second repeating cycle are controlled by the position of the rotatable knob 44.

Independent claim 1 of the present application requires a time base dial that is coupled to the control unit for setting the duration of the repeating cycle. The time base dial allows the user to select the length of the repeating cycle separate from the percent range selected by the duty cycle dial. Thus, the user is able to control not only the activation percentage by the duty cycle dial, but also the duration of each cycle through the time base dial. This type of timer is not taught or suggested, nor rendered obvious by the Payne '062 patent.

Instead the Payne '062 patent teaches a repeating cycle of one second that is standard regardless of the position of the dials on the oven. The duty cycle dial, referred to as the rotatable knob 44, allows a user to set the operating percentages of the browning system and the microwave system within the defined one second shared period. Thus, the length of the shared period cannot be adjusted by the user, as is the case with the timer of claim 1. For these reasons, the Payne '062 patent does not teach or suggest, nor render obvious, the subject matter of claim 1.

In rejecting claim 1, the Examiner indicated that the Rulseh '960 patent taught the use of time base settings that increase non-linearly from a minimum setting to a maximum setting.

The Rulseh '960 patent teaches a preset timer that includes a dial 3 having a timer range from 0 minutes to 30 minutes over 327.6° of the dial. During the first 150°, 5 minutes are represented linearly, while only 8 non-linear minutes are represented over the next 96°. The final 17 minutes are displayed linearly over the final 81.6° such that the dial includes three different operating ranges with different resolutions. As the disclosure of the Rulseh '960 patent indicates, this type of arrangement allows the user greater accuracy for short timing periods where the increased accuracy is needed while providing for an overall longer time period and lower resolution towards the maximum value where accuracy is unnecessary.

The Rulseh '960 patent provides an intermediate variable speed timing range to connect the two constant speed timing ranges (high speed and low speed), but also indicates that the intermediate dial range requires a non-linear scale. The patent specification notes that the intermediate range is "but a small portion of the dial range which is seldom used." The nature of the gear train necessary to get two linear speeds with an intermediate non-linear speed requires a continuous and monotonic transition segment of pitch radius between the driven gear and the output gear in order to insure constant meshing of the gear teeth.

The Rulseh '960 patent specifically dismisses the advantages of a non-linear timer because of the potential for confusion to the user. To the contrary, the present application seeks to take advantage of this very same non-linearity in order to

provide approximately five orders of magnitude of control range, in well-marked discrete settings, all repeatable and accurate with digital precision.

Further, the Rulseh '960 patent does not disclose a time base dial that allows the user to select the duration of the repeating cycles. Thus, the combination of the Rulseh '960 patent with the Payne '062 patent does not teach or suggest, nor render obvious, the subject matter of claim 1. Thus, independent claim 1 is believed to be in condition for allowance.

Dependent claims 2-8 depend directly or indirectly from amended independent claim 1 and are thus believed to be allowable for the above reasons as well as in view of the subject matter of each claim.

Specifically, dependent claim 4 requires the amount of increase in the percentage between successive duty cycle settings on the time base dial to be smaller near both the minimum setting and the maximum setting and larger near the mid point. Thus, the resolution is greater near both the maximum and minimum settings. In rejecting claim 4, the Examiner stated that the Rulseh '960 patent taught this feature.

The applicant disagrees with the Examiner's interpretation of the Rulseh '960 patent. As set forth above, the Rulseh '960 patent teaches a dial having minute indicators from 0 to 30 where the dial space of each minute is 30° for each minute from 0 to 5 minutes and 4.8° per minute from 13 to 30 minutes near the maximum setting. Thus, the dial in the Rulseh '960 patent has maximum resolution near the minimum setting and minimum resolution near the maximum time setting.

As required by claim 4, the time base dial is configured such that greater resolution exists near both the minimum and the maximum settings which allows the operator to have greater control over the duration of the repeating cycle near the maximum and minimum settings. This selection of timing is not rendered obvious by the subject matter of the Rulseh '960 patent.

Claims 9-16

In rejecting independent claim 9, the Examiner again relied upon the combination of the Payne '062 patent with the Rulseh '960 reference. Specifically, the

Examiner stated that the Payne '062 patent taught the entire claimed invention except for the non-linear increase in the time base setting from a minimum setting to a maximum setting.

Independent claim 9 has been amended to more particularly state that the time base dial is used to set the duration of the repeating cycle, while the duty cycle dial is used to set the percentage of actuation time of the load during the repeating cycle.

As set forth above in the arguments for allowance of claim 1, the Payne '062 patent does not teach or suggest, nor render obvious, a time base dial that allows the user to select the duration of the repeating cycle. Instead, the Payne '062 patent teaches a system in which the repeating cycle is preset at 1 second regardless of the dial settings on the microwave oven. Although the Payne '062 patent does teach a duty cycle dial that allows the percentage of actuation time to be adjusted, the overall duration of the repeating cycle cannot be changed by the user. Further, the Rulseh '960 patent also cited by the Examiner does not teach or suggest this type of time setting capability.

Therefore, the combination of the Payne '062 patent with the Rulseh '960 patent does not teach or suggest, nor render obvious, the subject matter of amended independent claim 9. For this reason, independent claim 9 is believed to be allowable over the references cited by the Examiner.

Dependent claims 10-16 depend directly or indirectly from claim 9 and are thus believed to be allowable based upon the above arguments for allowance, as well as the subject matter of each claim.

Dependent claim 12 includes the limitation that the amount of increase in the duty cycle between successive duty cycles is smaller near the minimum duty cycle setting and the maximum duty cycle setting such that the resolution is greater near the maximum and minimum settings. In rejecting claim 12, the Examiner indicated that the Rulseh '960 patent taught such resolution selections.

However, as set forth above in the arguments for allowance for claim 4, it is clear that the Rulseh '960 patent teaches greater resolution near the minimum setting and much less resolution near the maximum setting, with moderate resolution

therebetween. Thus, the Rulseh '960 patent does not teach or suggest, nor render obvious, the subject matter of claim 12.

Claims 17-19

In the Office Action, the Examiner rejected claim 17 based upon the combination of the Payne '062 patent and the Rulseh '960 reference. By the present amendment, independent claim 17 has been amended to indicate that the time base settings increase exponentially from the minimum setting to the maximum setting to provide an increased range of possible settings. In rejecting claim 19 of the original application, the Examiner indicated that the Payne '062 reference taught this type of increase in the value of time base.

Upon reviewing the Payne '062 patent, it is clear that the reference does not discuss an exponential increase in the time base. Instead, the '062 reference teaches an upper control knob that allows the user to select a cooking time between as little as a minute up to an hour. However, there is no suggestion that the time settings increase exponentially, as required by claim 17. Further, the Rulseh '960 patent teaches a time setting that includes three time setting ranges, in which the first time range includes a linearly increasing section, the second time range includes a non-linearly increasing section, while the third time range includes another linearly increasing section. Thus, the time base settings do not increase in an exponential manner from the minimum setting to the maximum setting, as required by claim 17.

The increase in the time base settings, as required by claim 17, allows the single dial to cover a much larger range of time delays while using the single rotating dial. This feature is not taught nor suggested, nor rendered obvious, by any of the references cited by the Examiner. Thus, independent claim 17 is believed to be in condition for allowance.

Conclusion

By the present amendment, the applicant has addressed all of the outstanding issues raised by the Examiner in the Office Action of October 7, 2002 and as such claims 1-18 are believed to be in condition for allowance. The applicant

hereby requests withdrawal of the rejection of claims 1-18 and passage of the entire application to allowance.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Marked-Up Version".

The Examiner is invited to contact the applicant's undersigned attorney with any suggestions or comments, or to otherwise facilitate prosecution of the present application to allowance.

Respectfully submitted,

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MARKED-UP VERSION

Serial No. 09/903,368

1. (Amended)A timer for controlling the activation of a load during repeating cycles, the timer including:

a control unit having an internal timer;

a relay unit connected between the control unit and the load, wherein the control unit activates the relay unit to supply power to the load;

a time base dial coupled to the control unit, the time base dial movable between a plurality of discrete time base settings to set the duration of the repeating cycle in the control unit, wherein the time base settings increase non-linearly from a minimum setting to a maximum setting; and

a duty cycle dial coupled to the control unit, the duty cycle dial movable between a plurality of discrete duty cycle settings to set the percentage of actuation time of the load during each repeating cycle in the control unit.

7. (Amended)The timer of claim 1 wherein the time base dial ~~is~~ generates a digital ~~switch~~ signal defining thirty-two discrete time base settings.

9. (Amended)A timer for controlling the activation of a load during repeating cycles, the timer including:

a time base dial movable between a plurality of discrete time base settings to set the duration of the repeating cycle between a maximum setting and a minimum setting;

a duty cycle dial movable between a plurality of discrete duty cycle settings to set the percentage of actuation time of the load during each repeating cycle between a maximum setting and a minimum setting;

a control unit coupled to both the time base dial and the duty cycle dial, the control unit assigning a time base value ~~to~~ corresponding to the duration of the repeating cycle for each time base setting and a duty cycle value ~~to~~ corresponding to the percentage of actuation for each duty cycle setting, wherein the time base values increase non-linearly from the minimum time base setting to the maximum time base setting; and

a relay unit coupled between the control unit and the load, the relay unit being activated by the control unit to supply power to the load based upon the time base value and the duty cycle value corresponding to the current settings of the time base dial and the duty cycle dial.

15. (Amended)The timer of claim 9 wherein the time base dial ~~is~~ generates a digital ~~switch~~ signal having thirty-two discrete time base settings.

17. (Amended)A timer for controlling the activation time delay or deactivation time delay of a load, the timer including:

a control unit having an internal timer;

a relay unit connected between the control unit and the load, wherein the control unit activates the relay unit to supply power to the load; and

a time base dial coupled to the control unit, the time base dial movable between a plurality of discrete time base settings to set the duration of the time delay in the control unit, wherein the time base settings increase non-linearly from a minimum setting to a maximum setting~~.~~,

wherein the time base settings increase exponentially from the minimum setting to the maximum setting.

18. (Amended)The timer of claim 17 wherein the time base dial ~~is~~ generates a digital ~~switch~~ signal defining thirty-two discrete time base settings.